Date of Issue:
07 February 2018

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

SRM Number: 3037
SRM Name: Arsenous Acid (AsIII) Standard Solution
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended for use as a primary calibration standard for the quantitative determination of the arsenic species arsenous acid (AsIII). This SRM can be used for quality assurance when assigning values to in-house control materials. A unit of SRM 3037 consists of two 10 mL sealed borosilicate glass amber ampoules of an acidified aqueous solution prepared gravimetrically to contain a known mass fraction of arsenous acid. The solution contains hydrochloric acid at a volume fraction of approximately 1 %, which is equivalent to a concentration (molarity) of approximately 0.12 mol/L. Due to digestion of the starting material, arsenic trioxide, with sodium hydroxide, sodium is present in the ampoules at approximately 1000 mg/kg.

Company Information

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Standard Reference Materials Program
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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard:	Corrosive to metals	Category 1
Health Hazard:	Carcinogenicity	Category 1A

Label Elements

Symbol

Signal Word

DANGER

Hazard Statement(s)

H290	May be corrosive to metals.
H350	May cause cancer through inhalation.

Precautionary Statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P234	Keep only in original container.
P280	Wear protective gloves, protective clothing, eye protection.
P308+P313	If exposed or concerned, get medical attention.
P405	Store locked up.
P501	Dispose of contents and container according to local regulations.

Hazards Not Otherwise Classified: Not applicable.

Ingredients(s) with Unknown Acute Toxicity: Not applicable.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Hydrochloric acid

Other Designations:
Hydrochloric acid solution, HCl solution (no other designations listed)

Components are listed in compliance with OSHA's 29 CFR 1910.1200; for the actual values see the Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Hydrochloric acid	7647-01-0	231-595-7	1
Arsenous Acid	13464-58-9	n/a	0.1
Non-Hazardous Component(s)			
Sodium Chloride	7647-14-5	231-598-3	0.1
Water	7732-18-5	231-791-2	>75

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

Skin Contact: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eye Contact: Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Contact a poison control center immediately for instructions. Give water to rinse out mouth. Never give liquids to a person with reduced awareness or becoming unconscious. If vomiting occurs, keep head lower than hips to prevent aspiration. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

Most Important Symptoms/Effects, Acute and Delayed: Acid burns to skin, eyes, and lungs.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media:
Suitable: Use extinguishing media appropriate to the surrounding fire.
Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Thermal decomposition will form oxides of chlorine.

Special Protective Equipment and Precautions for Fire-Fighters: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 2 Fire = 0 Reactivity = 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

Methods and Materials for Containment and Clean up: Do not touch spilled material. Notify safety personnel of spills. Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Isolate hazard area and deny entry.

7. HANDLING AND STORAGE

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection". Handle glass ampoules with care.

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances (see Section 10, "Stability and Reactivity").

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Hydrochloric acid

NIOSH (REL): 7 mg/m^3; 5 ppm (Ceiling)
50 ppm (IDLH)
ACGIH (TLV): 2 ppm (Ceiling)
OSHA (PEL): 7 mg/m^3; 5 ppm (Ceiling)

Arsenous acid (as As, related to Arsenic, inorganic compounds)

NIOSH (REL): 0.002 mg/m^3 (15 min, Ceiling)
5 mg/m^3 (15 min, Ceiling)
ACGIH (TLV): 0.01 mg/m^3 (TWA)
OSHA (PEL): 10 $\mu g/m^3$ (cancer hazard, see 29 CFR 1910.1018, except Arsine as As, TWA)
5 $\mu g/m^3$ (Action Level)

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye/Face Protection: Wear splash resistant safety goggles with a face shield. An eye wash station should be readily available near areas of use.

Skin and Body Protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical-resistant gloves should be worn at all times when handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

NOTE: The physical and chemical data provided are for the pure hazardous components, hydrochloric acid and arsenous acid.

Descriptive Properties	**Hydrochloric acid (1 % of this SRM)**	**Arsenous Acid (0.1 % of this SRM)**
Appearance (physical state, color, etc.):	colorless to yellow liquid	colorless or white solid
Molecular Formula:	HCl	H_3AsO_3
Molar Mass (g/mol):	36.46	125.94
Odor:	pungent, irritating odor	not available
Odor threshold:	not available	not available
pH:	<2	not available
Evaporation rate (ether = 1):	>1	not available
Melting point/freezing point (ºC):	–114.22 (–227.6 ºF)	not available
Relative Density (g/L):	1.639	not available
Specific Gravity (water=1):	1 to 1.2	not available
Vapor Pressure (mmHg):	14 (20 ºC)	not available

Descriptive Properties	Hydrochloric acid (1 % of this SRM)	Arsenous Acid (0.1 % of this SRM)
Vapor Density (air = 1):	0.7 (water)	not available
Viscosity (cP):	not available	not available
Solubility(ies):	miscible with water	not available
Partition coefficient (n-octanol/water):	not available	not applicable
Thermal Stability Properties		
Autoignition Temperature:	not available	not available
Thermal Decomposition (°C):	not available	not available
Initial boiling point and boiling range:	not available	not available
Explosive Limits, LEL (Volume %):	not available	not available
Explosive Limits, UEL (Volume %):	not available	not available
Flash Point:	not available	not available
Flammability (solid, gas):	not available	not available

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperature and pressure.

Stability: X Stable _____ Unstable

Possible Hazardous Reactions: May react with evolution of heat; release toxic, corrosive, flammable or explosive gases on contact with water.

Conditions to Avoid: Heat, flames, sparks and other sources of ignition. May ignite or explode on contact with combustible materials.

Incompatible Materials: Acids, combustible materials, halo carbons, amines, bases, oxidizing materials, metals, halogens, metal salts, metal carbide, cyanides.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition will produce hydrogen chloride gas, chlorine, and arsenic salts.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Burning pain and severe skin corrosion, eye, lung, and blood damage, and cancer.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Inhalation of hydrochloric acid can damage the mucous membranes and upper respiratory tract. Short term exposure may cause irritation and inflammation of the upper respiratory tract, coughing, choking, sore throat, shortness of breath, headache, dizziness, and nausea. Long term exposure to acid fumes may cause damage to teeth, bronchial irritation, chronic cough, bronchial pneumonia, and gastrointestinal disturbances. Arsenic inorganic compounds may cause foamy sputum.

Skin Contact: Hydrochloric acid can cause severe skin burns. Severity of the damage depends on the concentration and duration of exposure. Effects of acid burns may be delayed. Short term contact with arsenic inorganic compounds can cause irritation and may cause sensitization.

Eye Contact: Hydrochloric acid and arsenic inorganic compounds can cause severe eye irritation, corneal burns, permanent eye damage, or blindness. Severity of the damage depends on the concentration and duration of exposure.

Ingestion: If ingested, concentrated hydrochloric acid can cause burns to the gastrointestinal tract. Acute ingestion of low levels of arsenic inorganic compounds can cause tearing, diarrhea, bluish skin color, kidney damage, liver damage, and death. Chronic ingestion may have the same effects and may also cause cancer.

Numerical Measures of Toxicity:

Acute Toxicity: Not classified.
Hydrochloric acid: Rat, Inhalation LC50: 1.68 mg/L (1 h)
Rat, Oral LD50: 238 mg/kg to 277 mg/kg
Rabbit, Dermal LD50: >5010 mg/kg

Skin Corrosion/Irritation: This SRM contains 1 % of hydrochloric acid and it is not classified.

Serious Eye Damage/Irritation: This SRM contains 1 % hydrochloric acid and it is not classified.

Respiratory Sensitization: No data available.

Skin Sensitization: No data available.

Germ Cell Mutagenicity: No data available.

Carcinogenicity: Category 1A.

Listed as a Carcinogen/Potential Carcinogen X Yes _____ No

Hydrochloric acid is listed by IARC as Group 3, (*not classifiable*).

NTP lists Arsenic (inorganic compounds) as known human carcinogen. IARC lists arsenic in Group 1 (carcinogenic to humans). OSHA lists inorganic arsenic as a designated carcinogen.

Reproductive Toxicity: Not classified.
Hydrochloric acid: Rat, Inhalation TCLo: 450 mg/m^3 (1 h prior to copulation, 1 d)

Specific Target Organ Toxicity, Single Exposure: Not classified.

Specific Target Organ Toxicity, Repeated Exposure: Not classified.

Aspiration Hazard: No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Hydrochloric acid, Mosquitofish (*Gambusia affinis*), LC50: 282 mg/L, static (96 h)
Shore crab (*Carcinus maenas*), LC50: 240 mg/L (48 h)

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of waste in accordance with all applicable federal, state, and local regulations. Hydrochloric acid subject to disposal regulations: U.S. EPA 40 CFR 262, Hazardous Waste Number: D002.

Arsenic acid Hazardous Waste Numbers: P010, D004. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level (5.0 mg/L).

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: UN1789, Hydrochloric acid, solution, Hazard Class 8, Packing Group III, Excepted Quantity E1.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4): Hydrochloric acid, 5000 lb (2270 kg) RQ.
Arsenic acid, 1 lb (0.454 kg) RQ

SARA Title III Section 302 (40 CFR 355.30): Hydrochloric acid, 500 lb TPQ (gas only).

SARA Title III Section 304 (40 CFR 355.40): Hydrochloric acid, 5000 lb EPCRA RQ (gas only).

SARA Title III Section 313 (40 CFR 372.65): Hydrochloric acid: 1 % de minimis concentration (acid aerosols including mists, vapors, gas, for, and other airborne forms of any particle size).
Arsenic acid, 0.1 % de minimis concentration (related to Arsenic inorganic compounds)

OSHA Process Safety (29 CFR 1910.119):

Regulated for Hydrochloric acid at higher concentrations 500 lb TQ (anhydrous).

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH:	No.
CHRONIC HEALTH:	Yes.
FIRE:	No.
REACTIVE:	No.
PRESSURE:	No.

State Regulations:

California Proposition 65: WARNING! This product contains a chemical known (arsenic inorganic compounds) to the state of California to cause cancer.

U.S. TSCA Inventory: Hydrochloric acid and arsenous acid are listed.

TSCA 12(b), Export Notification: Not listed.

Canadian Regulations: WHMIS Information is not provided for this material.

16. OTHER INFORMATION

Issue Date: 07 February 2018

Sources: ChemAdvisor, Inc., SDS *Hydrochloric Acid*, 09 December 2015.

Hazardous Substances Data Bank, National Library of Medicine, *Hydrochloric Acid CAS 7647-01-0*, available at https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB (accessed Feb 2018).

Hazardous Substances Data Bank, National Library of Medicine, *Arsenic Compounds No CAS Registered Number*, available at https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB (accessed Feb 2018).

ChemIDplus, National Library of Medicine, *Arsenous Acid RN: 13464-58-9*, available at: https://chem.nlm.nih.gov/chemidplus/rn/13464-58-9 (accessed Feb 2018).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NRC	Nuclear Regulatory Commission
ALI	Annual Limit on Intake	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
EC50	Effective Concentration, 50%	RM	Reference Material
EINECS	European Inventory of Existing Commercial Chemical Substances	RQ	Reportable Quantity
EPCRA	Emergency Planning and Community Right-to-Know Act	RTECS	Registry of Toxic Effects of Chemical Substances
IARC	International Agency for Research on Cancer	SARA	Superfund Amendments and Reauthorization Act
IATA	International Air Transport Association	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration, 50 %	STEL	Short Term Exposure Limit
LD50	Lethal Dose, 50 %	TLV	Threshold Limit Value
LEL	Lower Explosive Limit	TPQ	Threshold Planning Quantity
MSDS	Material Safety Data Sheet	TSCA	Toxic Substances Control Act
NFPA	National Fire Protection Association	TWA	Time Weighted Average
NIOSH	National Institute for Occupational Safety and Health	UEL	Upper Explosive Limit
NIST	National Institute of Standards and Technology	WHMIS	Workplace Hazardous Materials Information System
n.o.s.	Not Otherwise Specified		

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at https://www.nist.gov/srm.